INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(54) Title: PHONE-TO-PHONE INTERNET PHONE EXCHANGE SYSTEM
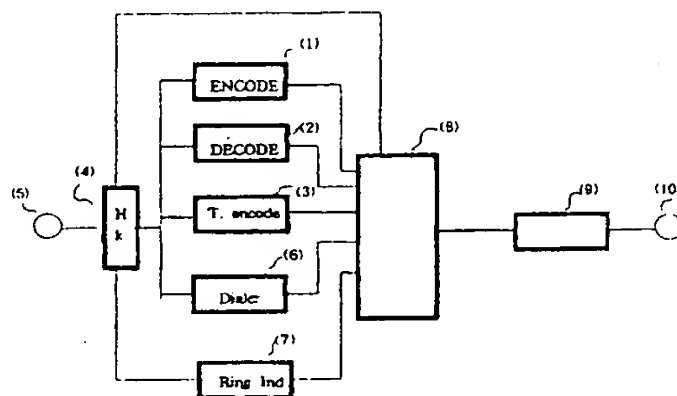
(57) Abstract

The phone-to-phone Internet phone exchange system or the phone-to-phone Internet server of the present invention includes computer controller (8), encoder (1), decoder (2), tone encoder (3), dialler (6), ring indicator (7), and Internet interface device (or modem) (9). When a person telephones to a caller-side server with his phone unit, the computer controller (8) of the caller-side server identifies this call by checking the ring indicator (7). Then it controls the hook controller (4) to connect the caller's phone line to the server. After connecting to the caller's phone, it transfers voice guidance messages data through the decoder, which converts voice digital data to analog voice signals that the caller can hear on his phone unit. According to guidance messages, the caller selects an appropriate service among a call, fax, and voice mail, and depresses the phone number that he wants to call. The computer controller (8) receives that phone number through the tone encoder, and analyzes the phone number to identify country or area for finding out a proper receiver-side server address. After finding out the receiver-side server, the computer controller (8) of the caller-side server sends the phone number to the receiver-side server through Internet network line.

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DESCRIPTION

PHONE-TO-PHONE INTERNET PHONE EXCHANGE SYSTEM

[TECHNICAL FIELD]

This invention   relates to Internet phone exchange system. Particularly this
5   invention relates to a phone-to-phone Internet phone exchange system.

[BACKGROUND ART]

The majority of Internet telephone exchange system is PC(personal
computer)-to-PC system or PC-to-phone system.
In PC-to-PC system, a caller's voice, encoded to digital data by the PC
10 equipped with microphone and sound card, are transferred to opposite receive
r's PC through Internet network. And these transferred voice digital data are
decoded to analog voice signals by the receiver's computer sound card and
speaker, and the receiver can hear the caller's voices. The receiver's voice ,
encoded to digital data by the PC equipped with microphone and sound card,
15 are also transferred to the opposite caller's PC through Internet network.
And these transferred caller's voice digital data are also decoded to analog
voice signals for caller to hear the receiver's voice. By doing so, caller can
talk to the receiver on the PC-to-PC Internet phone.
In PC-to-phone system, a caller's voices, encoded to digital data by the PC
20 equipped with microphone and sound card, are trasferred to a opposite
receiver-side phone server through Internet network. And these digital data
are converted to original voice signals by the phone server and are sent to
the receiver phone through phone network line.
The voice signals on a receiver's phone are also sent to the phone sever on
25 the side of the receiver through phone network, and are encoded to digital
data by the phone server. These digital data are then transferred to the
caller's PC and decoded to voice signal by the PC with a speaker and a
sound card. By doing so, a caller with PC can talk with a receiver with
. phone through Internet network.
30 The above two Internet phone exchange systems in the prior art have the

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disadvantage that a person, who does not have a PC equipped with a microp
hone, a speaker, and a sound card, can not use Internet phone.
Thus, there exists a need for Internet phone exchange system that is
available for persons with only phone to telephone each other.

5   [DISCLOSURE OF INVENTION]

It is an object of this invention to provide a phone-to-phone Internet phone
exchange system(server).
It is a further object of the present invention to provide a Internet phone
exchange system that enable persons with only phone to telephone together.
10   It is a further object of the present invention to provide the means for a
      person to telephone to the other person with ordinary phone easily and
      cheaply.
      Futher objects of the present invention will be made apparent in the
      following Best Modes For Carrying Out Invention and the appended claims.
15   The foregoing objects are accomplished in the preferred embodiment of the
      invention by a phone-to-phone Internet server (phone exchange system)
      that a caller can talk together with a receiver through Internet network line.
      The phone-to-phone Internet server includes a computer controller,
      encoders, decoders, tone encoders, dialers, ring indicators, and Internet
20   interface devices (or modem).
      Encoder is for converting analog voice signals on the phone line to digital
      voice data by the computer controller. These converted digital voice data will
      then be sent to the opposite site phone-to-phone server.
      Decoder is for converting digital voice data received from other server
25   through Internet network to analog voice signals. These converted analog
      voice signal will be sent to the caller (or receiver) through phone network
      line by the server. Tone encoder is for identifing phone numbers, which are
      entered by the caller through phone network line, by the computer controlle
      r. These identified phone number will be sent to the opposite server and be
30   used for calling a opposite receiver.
      Nation code digits or area code digits of phone number, identified by the call
      er side server, are used to find out a Internet address of a receiver-side ser
      ver.
      Dialer is for calling a receiver through phone network line by the receiver-si

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de server, when the receiver-side sever receives a requested phone number s ent by the caller-side server.

Ring indicator is for checking that there are any call on a caller-side server. The computer controller of the caller-side server identifies a requested call o
5 n caller-side phone network line by checking the ring indicator.

Hook controller is for connecting phone network line to the server by the co mputer controller when there are phone calls from a caller through phone net work line or a requested call message from the caller-side server.

Internet interface controller or device is for connecting computer controller to
10 Internet network to exchange digital data with other server.

In this server system, a caller can select a call, fax, or voice mail service by choosing an appropriate phone digit according to the voice guidance from the caller-side server.

And it is also possible to select a call, fax, or voice mail service by depressi
15 ng service code digits before entering the phone number on the phone unit o f the caller.

The overall operartion is as follows. A person, who wants to call through Int ernet, telephones to a caller-side server with his phone unit through phone network line.
20 The computer controller of the caller-side server identifies this call by checki ng the ring indicator. Then the computer controller controls the hook controll er to connect the caller's phone line to the server. After connecting to the ca ller's phone, the computer controller transfers voice guidance messages data through the decoder, which converts voice digital data to analog voice signal
25 s that the caller can hear on his phone unit.

According to guidance messages, the caller selects an appropriate service am ong a call, fax, and voice mail, and depresses the phone number that he wan ts to call.

The computer controller receives that phone number through the tone encode
30 r, and analyze the phone number to identify a country or area for finding out a proper receiver-side server address. After finding out the receiver-side server, the computer controller of the caller-side server sends the phone num ber, received from the caller, to the receiver-side server through Internet net work line by using the Internet interface controller of the caller-side server.
35 The computer controller of the receiver-side server gets the phone number t hrough Internet network line by using the Internet interface controller of the

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receiver-side server, dials to the receiver by using its hook controller and d
ialer, and connects to the receiver. After connecting to the receiver, the comp
uter controller of the receiver-side server gets the receiver's voice signals a
s voice digital data by using of the encoder through phone network line, and
5 sends these voice digital data to the caller-side server by using of the Intern
et interface controller. It also receives the caller's voice digital data sent by t
he caller-side server through Internet network line, and converts these caller'
s voice data to analog voice signals by using the decoder.

These analog voice signals are inputed on the receiver-side phone network li
10 ne by the the computer controller of the reciver-side server for the receiver
to hear the caller's talk.

On the other hand, the caller-side server performs the same control procedu
res as that of the receiver-side server described above.

As the caller-side and the receiver-side server of the present invention perfo
15 rm the above controls, the caller and receiver can talk with ordinary phones
through Internet network line with low phone charge.

[BRIEF DESCRIPTION OF DRAWINGS]

Fig. 1 is a overall schematic view of the preferred embodiment of Internet p
hone exchange system of the present invention.
20 Fig. 2 is a overall operation configuration view of the present invention in In
ternet network.

Fig. 3 is a overall control flow chart of the present invention.

[BEST MODES FOR CARRYING OUT INVENTION]

Referring now to the drawings and particuraly to Fig 1. there is shown
25 therein a overall schematic view of the preferred embodiment of Internet
phone exchange system of the present invention..

In Fig 1. the phone-to-phone Internet server includes computer controller 8,
encoder 1, decoder 2, tone encoder 3, dialer 6, ring indicator 7, and Internet i
nterface device (or modem) 9.
30 Encoder 1 is for converting analog voice signals on the phone line to digital
voice data by the computer controller. These converted digital voice data will

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then be sent to the opposite site phone-to-phone server.

Decoder 2 is for converting digital voice data received from the other server through Internet network to analog voice signals. These converted analog voice signal will be sent to the caller (or receiver) through phone network line
5 by the server.

Tone encoder 3 is for identifing phone number, which are entered by the caller through phone network line, by the computer controller 8. This identified phone number will be sent to the opposite server and be used for calling a opposite receiver.

10 Nation code digits or area code digits of the phone number, identified by the caller-side server, are used to find out a Internet address of a receiver-side server.

Dialer 6 is for calling a receiver through phone network line by the receiver-side server, when the receiver-side sever receives a requested phone number
15 sent by the caller-side server.

Ring indicator 7 is for checking that there are any call on a caller-side server. The computer controller 8 of the caller-side server identifies a requested call on caller-side phone network line by checking the ring indicator 7.

Hook controller 4 is for connecting phone network line to the server by the
20 computer controller 8 when there are phone calls from a caller through phone network line or requested calls from the caller-side server.

Internet interface controller 9 is for connecting the computer controller 8 to Internet network to exchange digital data with other server.

In this server system, a caller can select a call, fax, or voice mail service by
25 choosing an appropriate phone digit according to the voice guidance from the caller-side server.

And it is also possible to select a call, fax, or voice mail service by depressing service code digits before entering the phone number on the phone unit of the caller.

30 The overall operartion is as follows. A person, who wants to call through Internet, telephones to a caller-side server with his phone unit. through phone network line.

The computer controller 8 of the caller-side server identifies this call by checking the ring indicator 7. Then the computer controller controls the hook co
35 ntroller 4 to connect the caller's phone line to the server. After connecting to the caller's phone, the computer controller transfers voice guidance messages

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data through the decoder, which converts voice digital data to analog voice s
ignals that the caller can hear on his phone unit.

According to guidance messages, the caller selects an appropriate service am
ong a call, fax, and voice mail, and depresses the phone number that he wan
5 ts to call.

The computer controller 8 receives that phone number through the tone enco
der, and analyze the phone number to identify a country or area for findin
g out a proper receiver-side server address. After finding out the receiver-si
de server, the computer controller 8 of the caller-side server sends the phone
10 number, received from the caller, to the receiver side server through Internet
network line by using the Internet interface controller 9 of the caller-side ser
ver.

The computer controller of the receiver-side server gets the phone number t
hrough Internet network line by using the Internet interface controller of the
15 receiver-side server, dials to the receiver by using of its hook controller 4 a
nd dialer 6, and connects to the receiver. After connecting to the receiver, th
e computer controller 8 of the receiver-side server gets the receiver's voice
signals as voice digital data by using of the encoder through phone network
line, and sends these voice digital data to the caller-side server by using of
20 the Internet interface controller 9. It also receives the caller's voice digital da
ta sent by the caller-side server through Internet network line, and converts
these caller's voice data to analog voice signals by using the decoder.

These analog voice signals are inputed on the receiver-side phone network li
ne by the the computer controller of the reciver-side server for the receiver
25 to hear the caller's talk.

In Fig. 2, an overall operation configuration view of the present invention in
Internet network is shown.

Ordinary phone units 40, 100 are used for telephoning by a caller or receiver.
Phone networks 50, 90 are connected to the Internet phone exchange systems
30 (servers) 60, 80, which are connected through Internet network 70.

Followings are the descriptions of the operation principles of this invention
according to Fig. 3, Fig.2, and Fig.1.

When the computer controller 8 is operated, it initializes all subsidary
controllers and itself in Step 200 of Fig. 3, and goes to Step 210. In Step
35 210, it check the ring indicator 7 to see whether there is a call.

If there is a call, it goes to Step 220, receives the call by controlling the

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hook controller 4, checks a current task. If there is other task, it goes to Step 230, sends waiting signals or waiting voice messages to the caller, and returns to Step 210. If it is idle without other task in Step 220, it goes to Step 240.

5 In Step 240, the computer controller 8 asks the caller to select a service among a call, a voice messages, and a fax service through the decoder 2, and requests the caller to depress a service digit button on the phone unit.

If the caller enters the requesting service digit, the computer controller 8 10 receives this digit through the tone encoder 3, identifies this digit, and goes to each requested service processing Step.

If the digit is for requesting a call, it goes to Step 250, announces the caller in voice message that the selected service is a call service, and prompts the caller to enter a receiver's phone number by the voice message.

15 If the caller enters the receiver's phone number, the computer controller receives it through the tone encoder 3, announces the entered phone number, as voice message, to the caller for confirming the phone number.

By analyzing this confirmed phone number, the computer controller 8 specifies the Internet address of a server that is located in the closest nation 20 and area of the receiver, and connects to the server through Internet network line. In this case, the computer controller 8 have a world-wide Internet phone-to-phone server address list, or searches the receiver-side Internet server address from a Internet phone-to-phone address managing server that has been built already.

25 Connecting the receiver-side server through Internet network line, the computer controller 8 sends the receiver's phone number to the receiver-side server.

After receiving the receiver'phone number, the receiver-side server dials to the receiver by using the dialer 6 through the local phone network line. If 30 the receiver responses, the receiver-side server sends on-line signals to the caller-side server through Internet network line. Then, the caller-side server sends on-line signals or messages to the caller, and starts to talk each other.

During on-line, each server converts analog voice signals, coming to the 35 server through the phone network line, to digital voice data, divides them to packet data in the constant time interval according to Internet transmitance

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specification, and sends them to the opposite server.

Each server also receives digital voice data coming from the opposite server through Internet network line, converts these voice data to analog voice signals by using the decoder 2, and sends them to the phone through phone
5 network line. Above processing control continues until the caller or receiver hooks off the phone.

If any server detects the signal that phone is hooked off, the computer controller 8 goes to Step 250 from Step 210.

If the caller selects a voice mail service request digit in Step 240, the
10 computer controller 8 goes to Step 260, and sends the voice messages to the caller that the caller is requested to enter phone number.

As the caller enters a receiver's phone number, the caller-side server ensures this phone number to the caller, analyzes this number to determine the Internet address of the receiver-side server, stores this Internet address,
15 and sends the caller voice guidance messages through phone network line by using the decoder 2, that requests the caller's voice messages for the receiver and the identification digit button for showing the end of the caller's messages.

While the caller speeks voice mail messages according to these guidance
20 messages, the computer controller 8 converts these analog voice mail messages into digital voice mail data by using the encoder 1, packs these digital voice data and the receiver's phone number as a file, and sends this file to the receiver side server through Internet network line.

After sending that file to the receiver-side server, the computer controller of
25 the caller-side server returns to Step 210 from Step 260.

If the caller selects a fax service in Step 240, it goes to Step 270, announces the caller that a fax service is selected, and requests the receiver-side fax number . As the caller enters the receiver's fax number, the computer controller 8 receives this number through the tone encoder 3,
30 analyzes this number, determines the receiver-side server , and memorizes the receiver's fax number.

Next, the computer controller 8 asks the caller to send the fax data, receives fax data from the caller, and stores these data in its memory device.
35 It also combines the received fax data and fax number as a file, sends the file to the receiver-side server, and return to Step 210 from Step 270 after

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sending the file.

If no call by checking the ring indicator 7 in Step 210, it goes to Step 280, and checks the call requested through Internet network line 10 and the Internet interface controller 9 by the other server.

5 If no call requested by the opposite server, it goes to Step 210, and if a call requested, it goes to Step 290.

In Step 290, the computer controller checks its current processing loads, and if busy state due to other processing servce, it goes to Step 300, sends a waiting signal to the opposite server through Internet network line, and
10 returns to Step 210.

If idle state in Step 290, it goes to Step 310, checks which service request has been arrive from the opposite server by analyzing the file data sent from the opposite server. If a call is requested, it goes to Step 320, finds out the receiver's phone number in the sent file data, and calls the receiver by using
15 the dialer 6. If no response from the receiver, it sends no receiving state message to the opposite server through Internet network line, if a reponse from the receiver, it sends a receiving state message to the opposite server.

After receiving this receiving state message, each server converts analog voice signals or digital voice data, to digital voice data or analog voice
20 signals by using the encode 1 and the decoder 2, and exchanges digital voice data with the opposite server in order for the caller and the receiver can talk together.   If it detects hook-off during the on-line, it goes to Step 210 from Step 320.

If the requested service is a voice mail service in Step 310, it goes to Step
25 330, find out the receiver's phone number in the sent file data, and dials with this phone number.

If a response by the receiver, the computer controller 8 of the receiver-side server sends voice mail messages through the decoder, and asks the receiver to depress a confirmation button digit.

30 If no confirmation button digit, it dials to the receiver again in a constant time interval. If receiving a confirmation signal through the tone encoder 3, it sends completion message to the opposite server, and returns to Step 210 from Step 330.

If the requested service is a fax service in Step 310, it goes to Step 340,
35 finds out the receiver's phone number in the received file, and dials with this phone number by using the dialer 6.

10

If a response by the receiver, the computer controller 8 of the receiver-side server sends fax data through the decoder 2, and asks the receiver to depress a confirmation button digit.

If no confirmation button digit, it dials to the receiver again in a constant
5   time interval. If receiving a confirmation signal through the tone encoder 3 , it sends completion message to the opposite server, and returns to Step 210 from Step 340.

By the above control process , the Internet phone-to-phone exchange system (server) of the present invention enable a caller and a receiver to have a
10 call, a fax, or a voice mail service only with a ordinary phone.

In the foregoing description certain terms have been used for brevity, clarity and understanding, however no unnecessary limitations are to be implied therefrom because such terms are for descriptive purposes and are intended to be broadly consrtrued. Moreover, the descriptions and limitations are by
15 way of examples and the invention is not limited to the details shown and described.

[INDUSTRIAL APPLICABILITY]

The Internet phone-to-phone exchange system (server) of the present invention enable a caller and a receiver to have a call, a fax, or a voice mail
20 service only with a ordinary phone or fax machine cheaply.

So, the present invention can be applied to a long distance call, international call, a fax, and voice mail service of a ordinary phone or fax machine.

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[CLAIMS]

1. The phone-to-phone Internet phone exchange system (server) includes computer controller, encoder, decoder, tone encoder, dialer, ring indicator, and Internet interface device (or modem).

5 Encoder is for converting analog voice signals on the phone line to digital voice data by the computer controller. These converted digital voice data will then be sent to the opposite site phone-to-phone server.

Decoder is for converting digital voice data received from other server through Internet network to analog voice signals. These converted analog voice si

10 gnal will be sent to the caller (or receiver) through phone network line by the server.

In a digital phone, these decoder and encoder performs a modem function.

Tone encoder is for identifing phone numbers, which are entered by the caller through phone network line, by the computer controller. These identified p

15 hone numbers will be sent to the opposite server and be used for calling a opposite receiver.

Nation code digits or area code digits of phone number, identified by the caller-side server, are used to find a Internet address of a receiver-side server.

Dialer is for calling a receiver through phone network line by the receiver-si

20 de server, when the receiver-side sever receives a requested phone number sent by the caller-side server.

Ring indicator is for checking that there are any call on a caller-side server. The computer controller of the caller-side server identifies a requested call on caller-side phone network line by checking the ring indicator.

25 Hook controller is for connecting phone network line to the server by the computer controller when there are phone calls from a caller through phone network line or requested calls from the caller-side server.

Internet interface device is for connecting computer controller to Internet network to exchange digital data with other server.

30 In this server system, a caller can select a call, fax, or voice mail service by choosing an appropriate phone digit according to the voice guidance from the caller-side server.

And it is also possible to select a call, fax, or voice mail service by depressing service code digits before entering the phone number on the phone unit o

35 f the caller.

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The overall operartion is as follows. A person, who wants to call through Int ernet, telephones to a caller-side server with his phone unit. through phone network line.

The computer controller of the caller-side server identifies this call by checki
5 ng the ring indicator. Then the computer controller controls the hook controll er to connect the caller's phone line to the server. After connecting to the ca ller's phone, the computer controller transfers voice guidance messages data through the decoder, which converts voice digital data to analog voice signal s that the caller can hear on his phone unit.

10 According to guidance messages, the caller selects an appropriate service am ong a call, fax, and voice mail, and depresses the phone number that he wan ts to call.

The computer controller receives that phone number through the tone encode r, and analyze the phone number to identify country or area for finding out
15 a proper receiver-side server address. After finding out the receiver-side ser. ver, the computer controller of the caller-side server sends the phone numbe r, received from the caller, to the receiver-side server through Internet netwo rk line by using the Internet interface controller of the caller-side server.

The computer controller of the receiver-side server gets the phone number t
20 hrough Internet network line by using the Internet interface device of the rec eiver-side server, dials to the receiver by using its hook controller and diale r, and connects to the receiver. After connecting to the receiver, the compute r controller of the receiver-side server gets the receiver's voice signals as voice digital data by using of the encoder through phone network line, and s
25 ends these voice digital data to the caller-side server by using of the Interne t interface controller. It also receives the caller's voice digital data sent by t he caller-side server through Internet network line, and converts these caller' s voice data to analog voice signals by using the decoder.

These analog voice signals are inputed on the receiver-side phone network li
30 ne by the the computer controller of the reciver-side server for the receiver to hear the caller's talk.

On the other hand, the caller-side server performs the same control procedu res as that of the receiver-side server described above.

As the caller-side and the receiver-side server of the present invention perfo
35 rm the above controls, the caller and receiver can talk with ordinary phones through Internet network line with low phone charge.
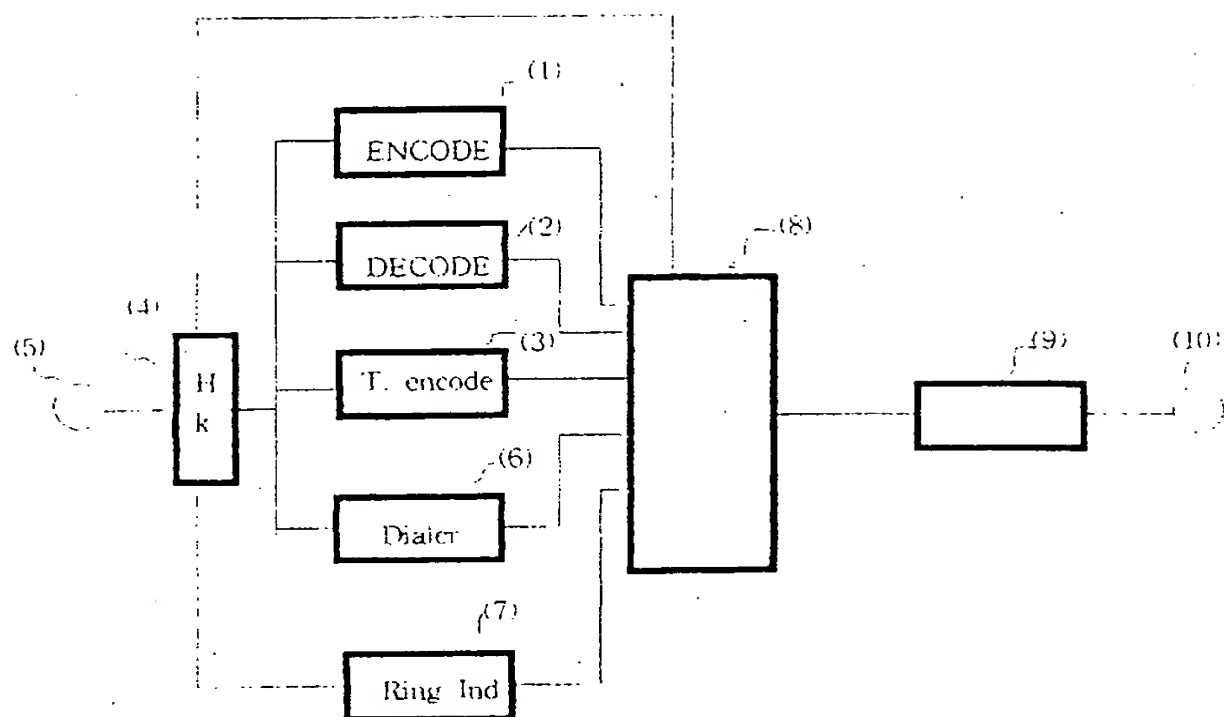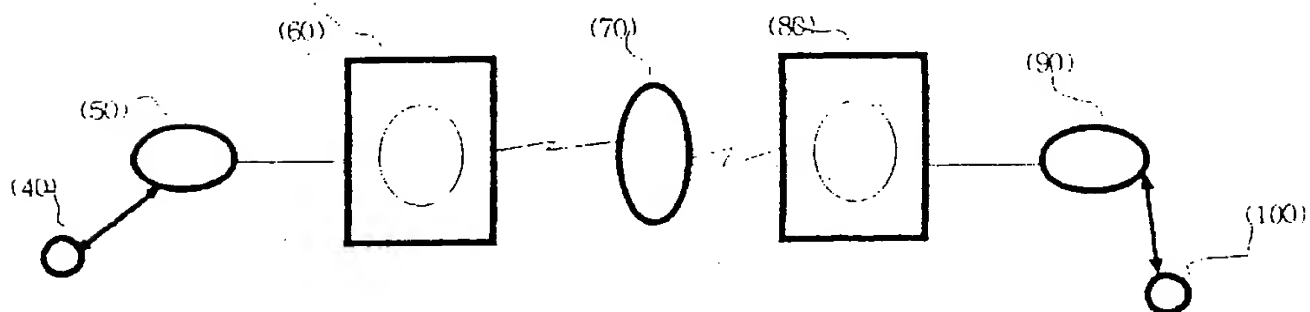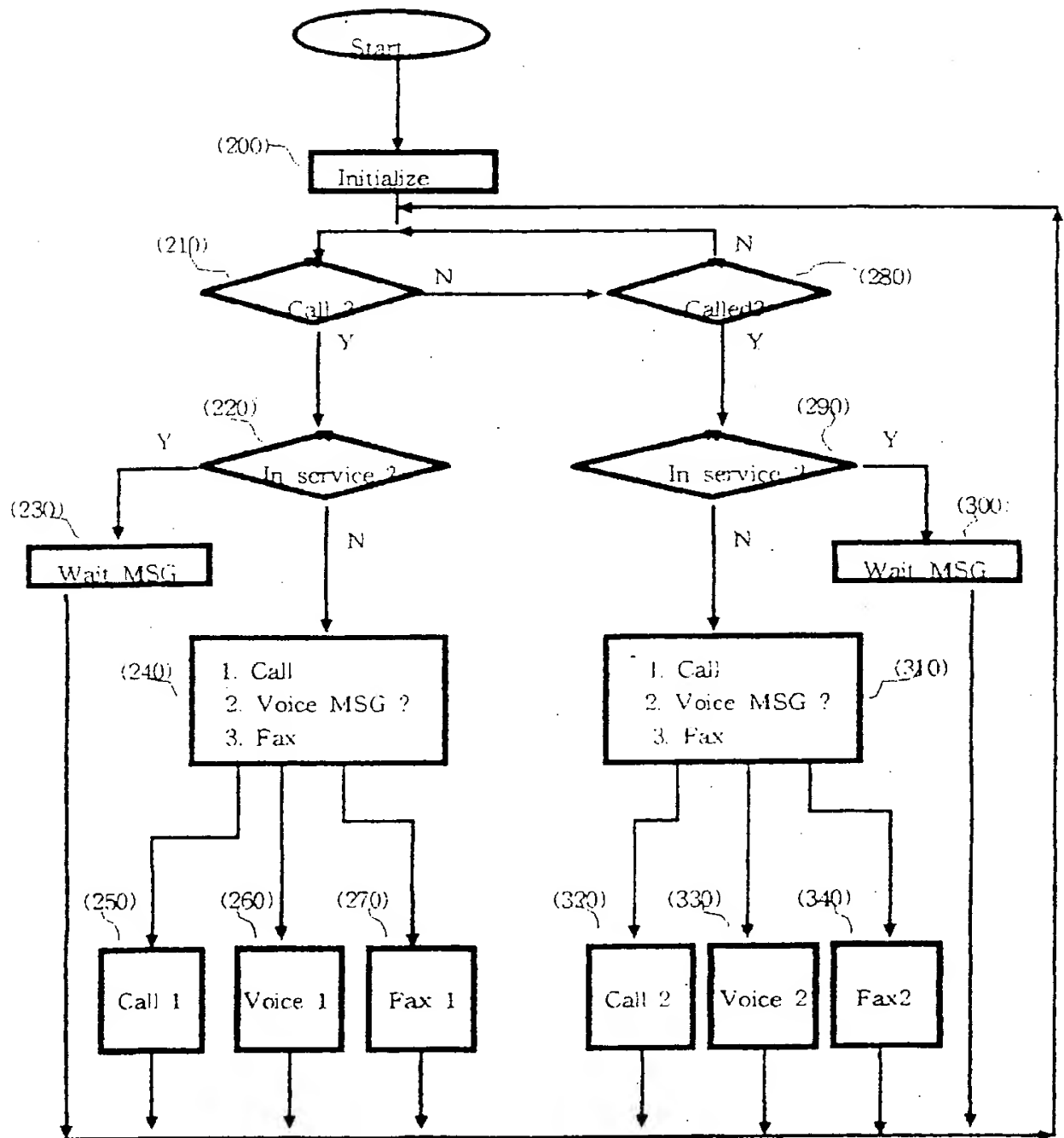
1 / 2

(1)

ENCODE

(2)

DECODE

(8)

(4)

(5)

H
k

(3)

T. encode

(9) (10)

(6)

Dialer

(7)

Ring Ind

FIG. 1

(60) (70) (80)

(50) (90)

(40) (100)

FIG. 2

2 / 2

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                          ┌─────────┐
                          (  Start  )
                          └────┬────┘
                               │
                               ▼
   (200)──              ┌──────────────┐
                        │  Initialize  │
                        └──────┬───────┘
                               │◄──────────────────────────────────┐
   (210)                       ▼              N                     │
          ┌────────────┐    N     ┌────────────┐   (280)            │
          ╱ Call ?      ╲───────►╱  Called?     ╲                   │
          ╲            ╱         ╲              ╱                    │
            ╲Y                     ╲Y                                │
             ▼                      ▼                                │
   (220)  ┌────────────┐       ┌────────────┐  (290)                │
       Y ╱ In service ? ╲     ╱ In service ? ╲ Y                     │
        ╱               ╲    ╲               ╱                       │
   (230) ╲            ╱  N    N ╲           ╱    (300)               │
    ┌──────────┐      │         │      ┌──────────┐                 │
    │ Wait MSG │      │         │      │ Wait MSG │                 │
    └────┬─────┘      ▼         ▼      └────┬─────┘                 │
         │      ┌──────────┐ ┌──────────┐   │                       │
  (240)  │      │ 1. Call  │ │ 1. Call  │  (310)                    │
         │      │ 2. Voice │ │ 2. Voice │   │                       │
         │      │    MSG ? │ │    MSG ? │   │                       │
         │      │ 3. Fax   │ │ 3. Fax   │   │                       │
         │      └──────────┘ └──────────┘   │                       │
         │   (250) (260) (270) (320)(330)(340)                      │
         │     ▼     ▼     ▼     ▼    ▼    ▼                         │
         │  ┌────┐┌─────┐┌────┐┌────┐┌─────┐┌────┐                  │
         │  │Call│Voice ││Fax ││Call││Voice││Fax2│                  │
         │  │ 1  ││  1  ││ 1  ││ 2  ││  2  ││    │                  │
         │  └──┬─┘└──┬──┘└──┬─┘└──┬─┘└──┬──┘└──┬─┘                  │
         │     ▼     ▼     ▼     ▼     ▼      ▼                      │
         └─────────────────────────────────────────────────────────┘
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FIG. 3

International application No.

PCT/KR 97/00179

A. CLASSIFICATION OF SUBJECT MATTER

IPC^6: H 04 M 3/42

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC^6: H 04 M 3/42, 3/50; H 04 N 7/173

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

WPIL

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO 96/20 553 A2 (ALPHANET TELECOM) 04 July 1996 (04.07.96), especially abstract; page 1, line 5 - page 6, line 30; fig.1-5; claims 1,9,11,13,15,19-22.	1
A	WO 96/27 989 A1 (MULTIMEDIA SYSTEMS) 12 September 1996 (12.09.96), especially abstract; page 1, line 5 - page 2, line 24; fig.2; claims 1,2,14.	1

☐ Further documents are listed in the continuation of Box C.   ☒ See patent family annex.

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
"E" earlier document but published on or after the international filing date
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
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Im Recherchenbericht angeführtes Patentdokument Patent document cited in search report Document de brevet cité dans le rapport de recherche	Datum der Veröffentlichung Publication date Date de publication	Mitglied(er) der Patentfamilie Patent family member(s) Membre(s) de la famille de brevets	Datum der Veröffentlichung Publication date Date de publication
WO A2 9620553	04-07-96	AU A1 42949/96 CA AA 2139081 EP A2 799543 US A 5608786 WO A3 9620553	19-07-96 24-06-96 08-10-97 04-03-97 12-09-96
WO A1 9627989	12-09-96	AU A1 51776/96 US A 5612730	27-09-96 18-03-97